CONTROLLED DOCUMENT
BID
Procedure #:
Part # : 72-11J Code : INS
Model # : 726349
Rev : Print date : 12/1/84
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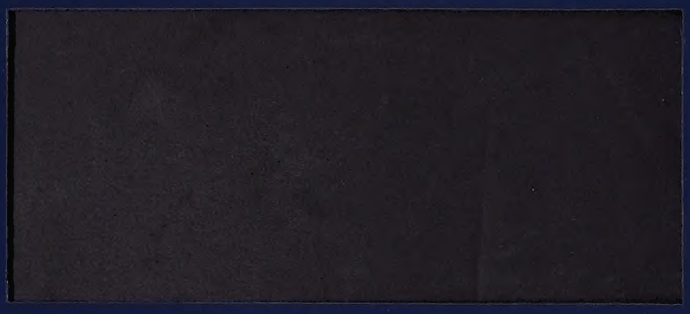
INSTRUCTION MANUAL 72-11J

MEGADEK™ HIGH-RESISTANCE CALIBRATION STANDARD CATALOG NO. 726349

BIDDLE

Biddle Instruments

510 Township Line Road, Blue Bell, PA 19422 · 215-646-9200



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MEGADEK™ HIGH-RESISTANCE CALIBRATION STANDARD CATALOG NO. 726349

12/84

BIDDLE INSTRUMENTS
Blue Bell, PA 19422

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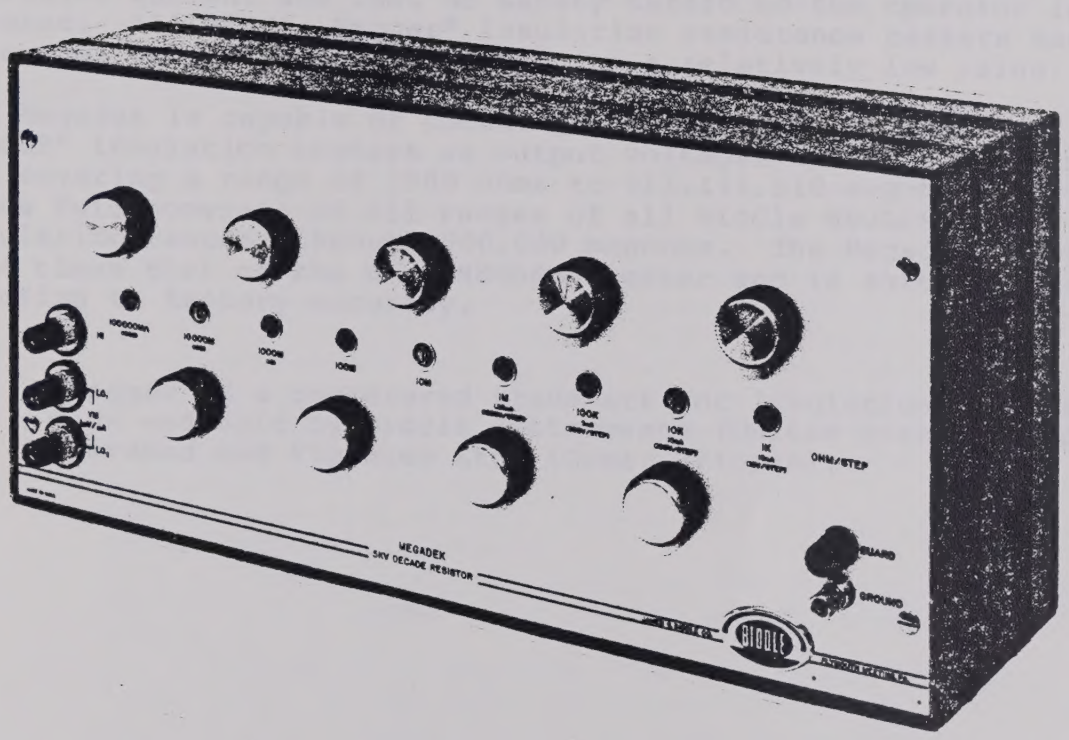
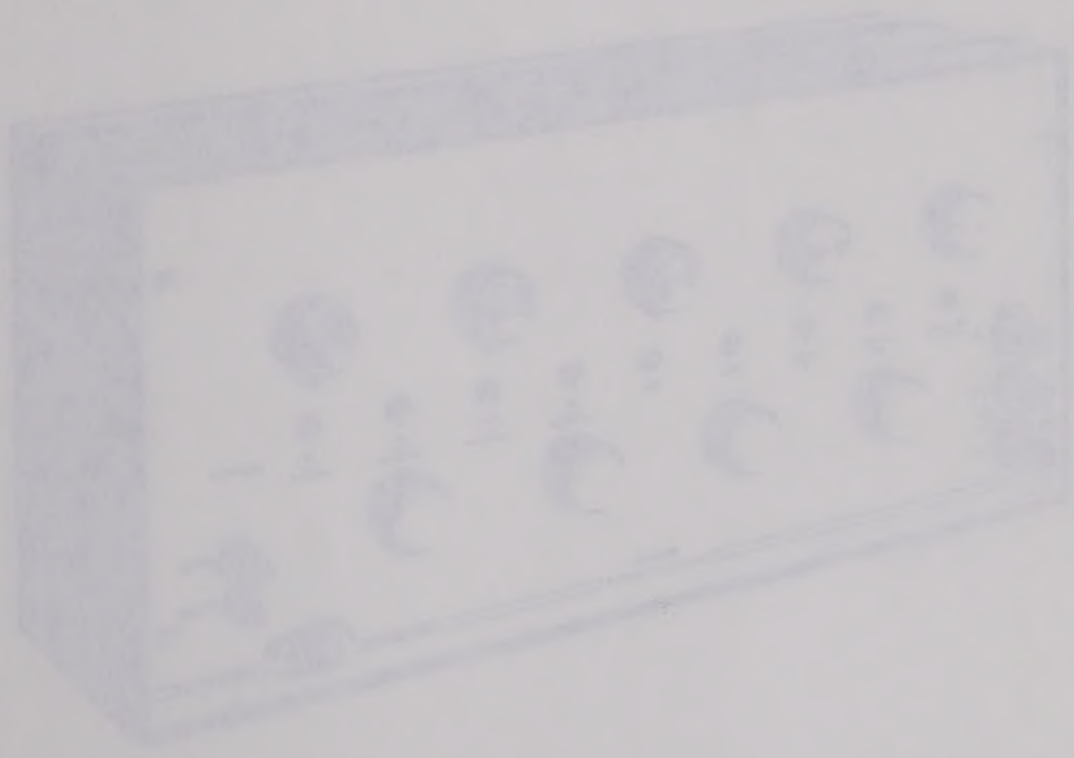
APPENDIXES:

SCHEMATIC DIAGRAM	3V 726349
WIRING DIAGRAM	3W 726349



Frontspiece Megadek™ Nine-Dial Decade
Resistance Standard, Cat. No. 726349



SECTION A

INTRODUCTION

The Biddle Catalog No. 726349 Megadek is a special-purpose resistance standard for calibration of Biddle MEGGER® insulation resistance testers. The Megadek is not rated for use with any other make or type of megohmmeter or insulation tester, or for any other purpose. Other applications require proper engineering evaluation to ensure that the instrument is not damaged by excessive current and that no safety hazard to the operator is created. All Biddle Megger® insulation resistance testers have an output current which is limited to a relatively low value.

The Megadek is capable of checking the accuracy of reading of all MEGGER* insulation testers at output voltages up to 5000 volts dc and covering a range of 1000 ohms to 611,111.110 megohms. This gives full coverage of all ranges of all Biddle MEGGER® insulation testers through 500,000 megohms. The Megadek accuracy is 4 times that of the best MEGGER® tester and is suitable for checking to factory accuracy.

*Megger is a registered trademark for insulation testers made and sold by Biddle Instruments (United States), and Evershed and Vignoles Ltd. (Great Britain).

SECTION B

SAFETY PRECAUTIONS

The Catalog No. 726349 Megadek does not itself generate electricity. However, in normal use when calibrating Megger insulation testers, it is connected to a current limited source of up to 5000V dc and therefore requires caution.

The Megadek design is only intended to be used with low current insulation testers. The design cannot fully protect the user when operating from hazardous voltage sources since the switch shaft is not grounded to the case.

Therefore, for your protection, take these safety precautions:

1. Keep the calibrator clean and well-maintained.
2. Never apply more than 5000 volts dc or peak even from a current limited source.
3. Do not connect to hazardous voltage sources. (Voltages more than 45V peak with currents above 5 mA 50/60 Hz or 10 mA dc may be hazardous to healthy adults.)
4. Connec to insulation testers only if marked with the trademark MEGGER and manufacturing name James G. Biddle Company, Biddle Instruments or Evershed & Vignoles Ltd, or other applications where there has been a complete engineering evaluation of the safety hazards and the possibility of damaging the instrument.
5. Connect the Case Ground terminal to a local safety ground before energizing.
6. Take all precautions in handling the connections to the Megger® instruments given in the appropriate instruction manual.
7. Any other application than used to calibrate Megger instruments is the sole responsibility of the user, who must assume liability for any risk to personnel or equipment.

SECTION C

RECEIVING

Your Biddle instrument has been thoroughly tested and inspected to meet rigid inspection specifications before being shipped. It is ready for use when installed as indicated in the manual.

When your Biddle instrument arrives, check the equipment received against the packing list to ensure that all materials are present. Notify Biddle Instruments, Blue Bell, PA of any shortage of materials.

Examine the instrument for damage received in transit. If any damage is observed, file a claim with the carrier at once and notify Biddle Instruments or its nearest authorized sales representative, giving a detailed description of the damages observed.

SECTION D

DESCRIPTION

The Megadek instrument is enclosed in a metal case with grounding terminal. Connections are by two insulated leads, marked "High" and "Low".

The working parts consist of nine Selector Switches with a set of ten selected high-quality resistors on each switch. The resistance per step ranges from 1000 ohms to 100,000 megohms. The switches select resistors to be connected in series across the High and Low terminals.

The three low-value decades are precision power wire-wound types. The higher value resistors are made of high-voltage cermet film on an alumina core. These resistors are specially formulated and fully tested to close tolerances for both temperature coefficient and voltage coefficient. Each one is adjusted by selection or padding to bring the value to the required tolerance. The Megadek is traceable to NBS thru calibration equipment maintained with regular certification by the United States National Bureau of Standards.

SECTION E

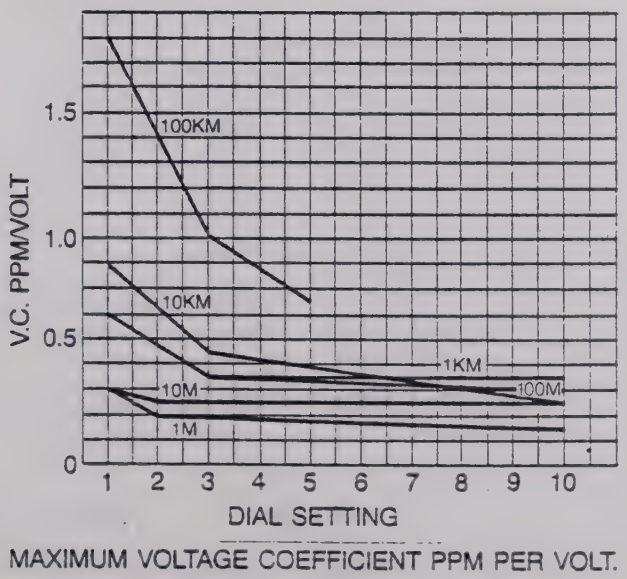
SPECIFICATIONS

RANGE - 0 - 611,111.110 megohms in steps of 1000 ohms.

LIMIT OF ERROR

CONDITIONS	1,10,100K STEPS	1M STEPS	10M STEPS	100M STEPS	1000M STEPS	10,000M STEPS	100KM STEPS
Initial calibration at 23±1°C, 10-50% RH, <100V	0.1%	0.1%			0.2%	0.5%	1.5%
Same after one year	0.2%	0.2%			0.5%	1%	3%
Temp coefficient ppm/°C (15-35°C)	30	100			100	500	500
Self-heating at full V Dial set at 1 Dial set at 2 Dial set at 3 Dial set at 4-10	0.3% ↓	0.4% ↓ *	0.6% 0.15% 0.06% <.05%	0.06% <.02%	Negligible (<0.02%) ↓		
Voltage coefficient ppm/Volt	Nil	See chart below.					

*Decreasing to 0.006% at 10.



MAXIMUM VOLTAGE COEFFICIENT PPM PER VOLT.

GUARD CIRCUIT

Entire resistor circuit is separated from case and external contact by an insulated metallic guard which interrupts conductive leakage. Guard consists of the switch frames and shafts and an inner switch support plate and jacketed shields on the leads.

VOLTAGE

If the calibrator is to be handled while energized, applied voltage must be restricted to a source which is not hazardous, such as Megger insulation testers.

To prevent damage to the calibrator, the limits of dc or peak voltage are:

Between High and Low terminals (dc or sine wave peak):

1K Steps	50V per step (50mA)
10K Steps	150V per step (15mA)
100K Steps	500V per step (5mA)
1M Steps	1250V per step (1.25mA) up to 5 kV.
Higher Steps	5kV total

Between Case, Guard and either H or L: 5000V dc.

INSULATION RESISTANCE

$>10^{14}$ ohms circuit to Case or Guard.

CONNECTIONS

Case Ground:	5-way metal binding post on case.
High:	12-inch shielded and jacketed lead with spade lug at the outboard end; also at the outboard end a separate 4" long lead connecting to the shield and having a standard banana plug termination (the Guard).
Low:	Same as High except without the Guard connection.

PHYSICAL

Case Material:	Aluminum
Dimensions:	19 1/4" x 9" x 7 3/16" deep (489 x 229 x 186 mm)
Weight:	12 3/4 lbs. (5.73 kg)

ACCESSORIES

Instruction Manual.

SECTION F

CALIBRATING MEGGER® INSULATION TESTERS

CAUTION!

THIS PROCEDURE APPLIES ONLY TO GENUINE MEGGER INSTRUMENTS; THERE MAY BE A SHOCK HAZARD FROM OTHER INSTRUMENTS.

(Follow the safety precautions of Section B.)

Setup

Set up the Megger tester on a table convenient for scale reading and, if necessary, cranking. Level the Megger tester if necessary.

Energize the Megger instrument and check infinity before leads are connected. If the Megger has an infinity adjuster make adjustment if necessary.

Set the Megadek on the table near the Megger instrument. With the Megger instrument not energized, connect as follows:

Megadek		MEGGER® Insulation Tester
High	to	Line or L
Guard*	to	Guard or G
Low	to	Ground, Earth or E

*If there is no guard terminal on the instrument, omit guard connection. Do not allow the insulation of the connecting wires to touch each other or anything else.

Calibration Checks

Single Range: Check the megohm reading of the Megger tester at several points.
Multiple Range: Check the megohm reading of the Megger tester at several points on the Xl multipler, and at least at one point on the other multiplier settings.

Compare each reading to the specified accuracy of the MEGGER® instrument. This is always given in inches or mm of scale deflection and must be estimated or measured using a suitable scale.

Do not be concerned that the output voltage of the Megger tester may be too great for the Megadek. This output voltage falls off as the connected resistance drops below 10 megohms; the Megadek is designed to work at any setting of any MEGGER® tester.

Selecting Calibration Points

The most thorough calibration method is to set the Megadek standard to three or four points on every scale and multiplier of the MEGGER® instrument being calibrated. Then compare the MEGGER® instrument reading to the Megadek setting to see if it is within the limits of accuracy. MEGGER® tester accuracy is always stated in terms of distance on the scale, not ohms; see the respective MEGGER® tester instruction manuals for this information.

Calibration can be shortened to save time with little loss of reliability. The principles of a shortened routine are:

a. Check conformity of each scale by picking one multiplier (voltage) setting and making several evenly spaced readings at that setting. A reading should be made at each end of the scale. The best choice is the X1 multiplier because it minimizes reading errors.

b. Check the multiplier ratios by selecting a point near mid scale and setting the Megadek for this value at all multipliers.

Reading Output Voltage of MEGGER® Insulation Testers

Some users wish to confirm the output voltage of a MEGGER® Tester. This is specified for no load. Output voltage is adjusted at the factory using an electrostatic voltmeter which has no load; therefore we can say the Megger tester is reading infinity.

The most direct way to check output voltage is to connect an electrostatic voltmeter, and with nothing else connected, operate the MEGGER® instrument and read the voltmeter. Electrostatic voltmeters of various ranges are available from Electrical Instrument Service, Inc. of Mount Vernon, NY.

An ordinary voltmeter or multimeter may be used only if its internal resistance is greater than the highest megohm reading on the MEGGER® instrument. If its resistance is lower, a low voltage reading will result.

SECTION G

ROUTINE MAINTENANCE

Care in Use, and Storage

Store and use the Megadek in a clean, dry place. Any contamination or moisture inside the instrument may affect the calibration.

Examine the instrument on a regular schedule, especially the leads for any mechanical damage. An annual calibration check is also recommended.

Equipment Needed for Calibration

Calibration requires a guarded Wheatstone bridge with a suitable accuracy and a range up to 10,000 megohms or higher. A test voltage of 50 to 100 volts should be available for the high values. A megohmmeter with a range of 10^{14} ohms or higher should also be available. Calibration should be done in a laboratory with the temperature at 23±1°C and the RH between 20% and 50%.

If this equipment is not available, we recommend that you return your Megadek to the factory for periodic calibration and check-up. Any necessary adjustments can be made at the same time.

SECTION H

REPLACEMENT PARTS LIST

QTY	DESCRIPTION	BIDDLE P/N
1	Case terminal	11166-4
1	"HIGH" cable with guard pin	18841-4
1	"LOW" cable	18841-3
2	Strain relief bushing for cable	2967-1
4	Dial assembly (top window)	22495-2
5	Dial assembly (bottom window)	22495-1
	Switch assemblies, with resistors, calibrated:	
	Dial 1, 100 KM steps	18135-1
	Dial 2, 10 KM steps	18135-2
	Dial 3, 1 KM steps	18135-3
	Dial 4, 100 M steps	18135-4
	Dial 5, 10 M steps	18135-5
	Dial 6, 1 M steps	18135-6
	Dial 7, 100 K steps	18135-7
	Dial 8, 10 K steps	18135-8
	Dial 9, 1 K steps	18135-9
	Resistors, calibrated:	
10	Dial 1, 50 KM, two required	18838-6**
10	Dial 2, 9.9 KM with pad to 10 KM	18838-5*
10	Dial 3, 990 M with pad to 1 KM	18838-4*
10	Dial 4, 99 M with pad to 100 M	18838-3*
10	Dial 5, 9.9M with pad to 10 M	18838-2*
10	Dial 6, 990 K with pad to 1 M	18838-1*
10	Dial 7, 100 K	18839-3
10	Dial 8, 10K	18839-2
10	Dial 9, 1K	18839-1
9	Switch	18405
9	Knob	4690-18
18	Screw, nylon insulating, 8-32 x 1/4 RH (2 each knob)	8623-38
5	Pair of insulating bushings for sub-plate	23643-1 & -2
1	Case	10901

* Specify "with pad" when ordering!
**Specify "matched pair" when ordering!

SECTION I

WARRANTY AND REPAIRS

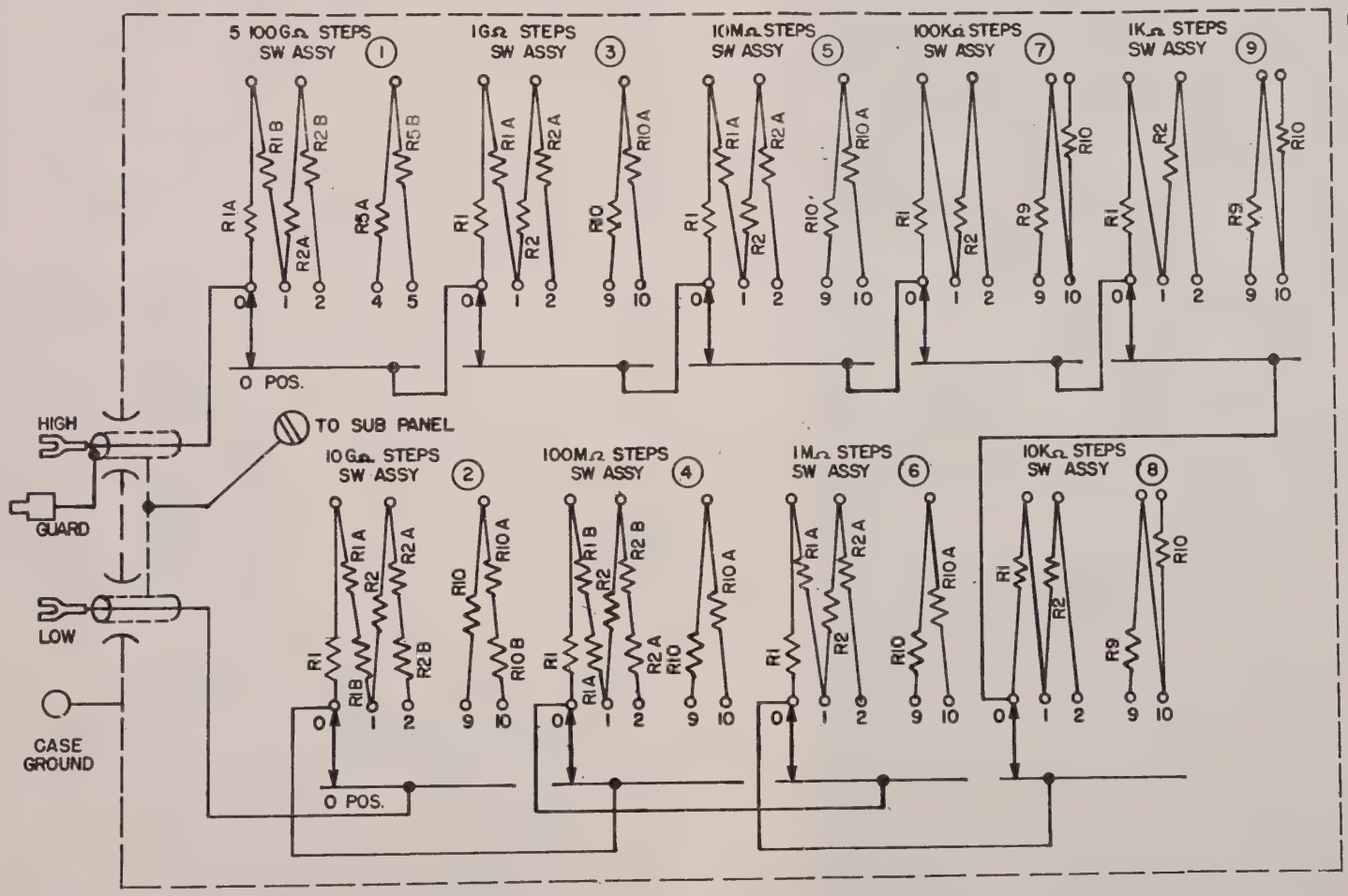
Warranty

All products supplied by Biddle Instruments are warranted against all defects in material and workmanship for a period of one year following shipment. Our liability is specifically limited to replacing or repairing, at our option, defective equipment. Equipment returned to the factory for repair will be shipped Prepaid and Insured. The warranty does not include batteries, lamps or tubes, where the original manufacturer's warranty shall apply. WE MAKE NO OTHER WARRANTY.

The warranty is void in the event of abuse or failure by the customer to perform specified maintenance as indicated in this manual.

Repairs

Biddle Instruments maintains a complete instrument repair service. Should this instrument ever require repairs, we recommend it be returned to the factory for repair by our instrument specialists. When returning instruments for repair, either in or out of warranty, they should be shipped Prepaid and Insured, and marked for the attention of the Instrument Service Manager.



NOTE:
SWITCH DECKS AREN'T ALIGNED

KEY BY DATE	REVISION	APP'D.

JAMES G. BIDDLE CO.
BLUE BELL, PA. 19422
A member of the THORN EMI Group

TITLE
SCHEMATIC
MEGADEK
9 DIAL

DRAWN PJH	DATE 1-21-83	SCALE	
CHECKED [illegible]	DATE 1-24-83	APPD. ELEC.	DATE
APPD MECH [illegible]	DATE 2-2-83	AUTHORIZED	DATE
DWG. CLASS 3V	PART NO. 726349	SH. 1 OF 1	

UNLESS OTHERWISE INDICATED ALL DIMENSIONS ARE IN INCHES.

DO NOT SCALE THIS DRAWING

TOLERANCES UNLESS OTHERWISE SPECIFIED			FINISH	MATERIAL:
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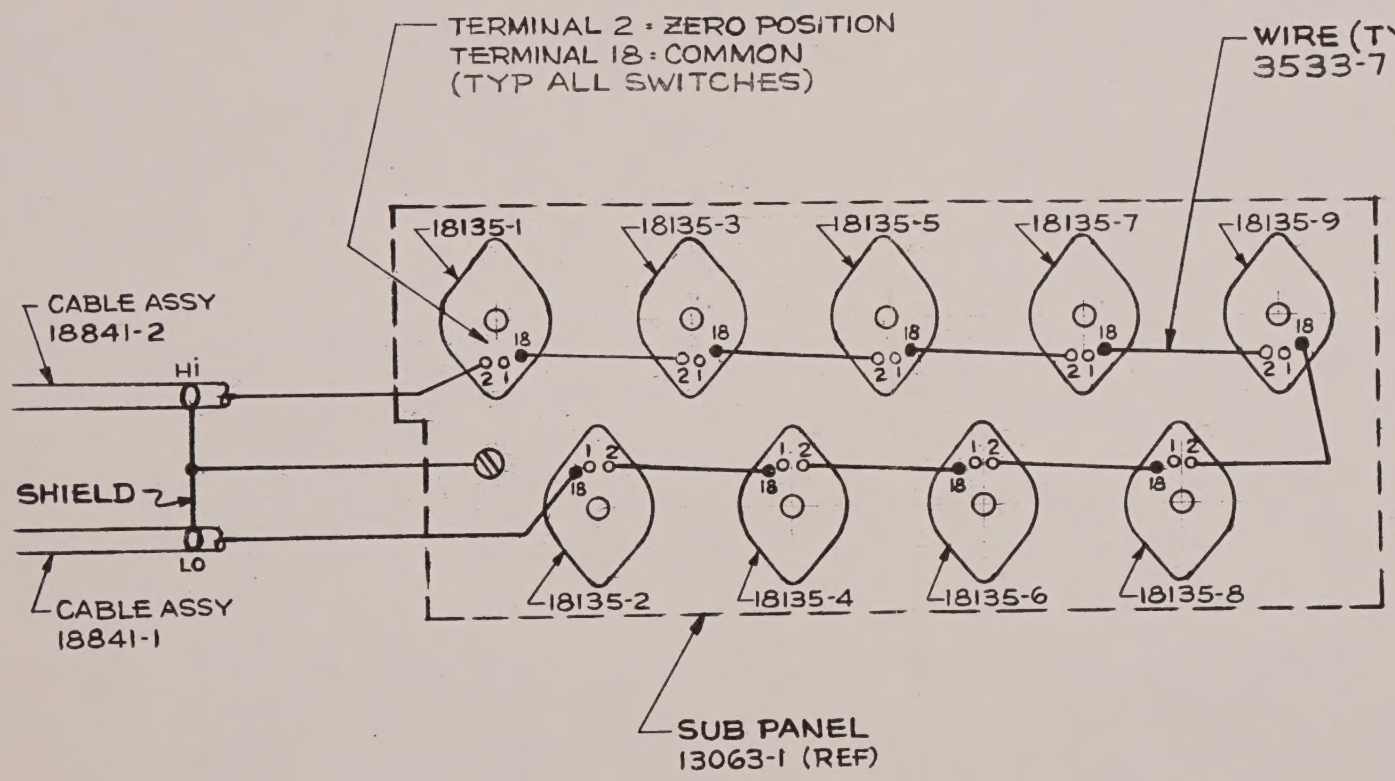

NOTE: 1/2" MIN. CLEARANCE OF WIRING TO FRAME.

KEY BY DATE	REVISION	APP'D.

JAMES G. BIDDLE CO.
BLUE BELL, PA. 19422
A member of the THORN EMI Group

TITLE: WIRING DIAG. 9 DIAL MEGADEK

DRAWN GMA	DATE 1-21-83	SCALE —	
CHECKED	DATE 1-24-83	APP'D. ELEC.	DATE
APP'D MECH	DATE 1-24-83	AUTHORIZED	DATE
DWG. CLASS 3W	PART NO. 726349		SH. OF

UNLESS OTHERWISE INDICATED ALL DIMENSIONS ARE IN INCHES.

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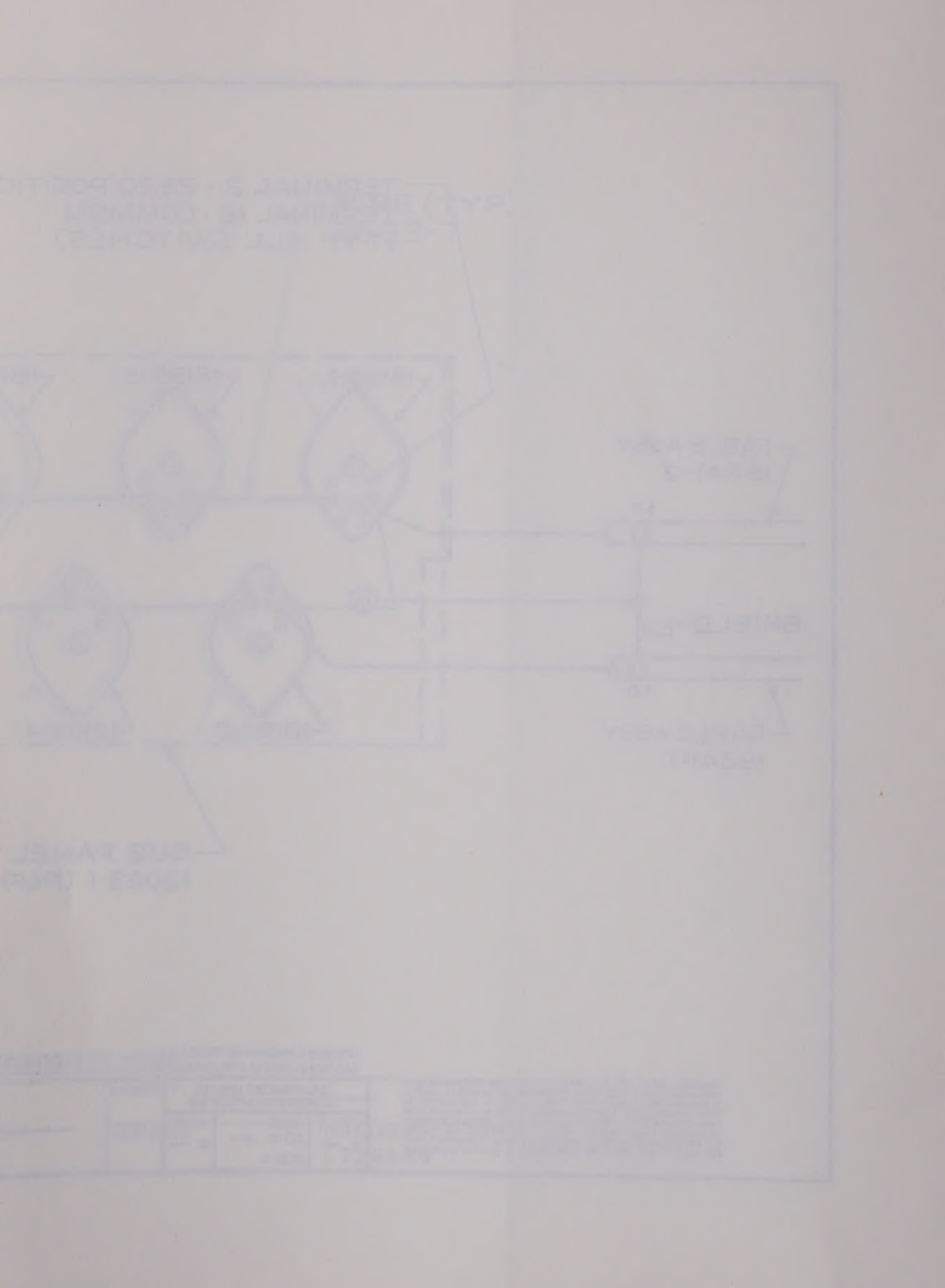

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